

Listing of the Claims:

The following is a complete listing of all the claims in the application, with an indication of the status of each:

1(Canceled).

1 2 (Currently Amended). The multi-beam antenna transmitter/receiver
2 according to claim 1, wherein said reception beam path detection means
3 selects the reception beam on the basis of the overall reception quality, and
4 said transmission beam selection means selects the transmission beam
5 having a direction which coincides with or is close to a direction of the
6 selected reception beam is selected.

1 3 (Currently Amended). The multi-beam antenna transmitter/receiver
2 according to claim 1, wherein said reception beam calculation means
3 uses reception power or an SIR (Signal to Interference Ratio) as an index
4 of the reception quality.

4 (Canceled).

1 5 (Currently Amended). ~~The A~~ multi-beam antenna transmitter/receiver
2 according to claim 4, wherein said user demodulation means further
3 comprises receiving a plurality of reception beams and transmitting a
4 plurality of transmission beams, and selecting a transmission beam on the
5 basis of overall reception qualities calculated from reception qualities of
6 path delays of user signals present in the plurality of reception beams, the
7 multi-beam antenna transmitter/receiver comprising:
8 a reception array antenna in which reception antenna elements are
9 arranged;
10 radio reception means for receiving outputs from the reception
11 antenna elements, performing a reception process for an input signal, and
12 outputting the signal;

13 reception beam formation means for receiving an output from said
14 radio reception means and forming a reception beam;
15 reception beam path detection means for detecting a path delay for
16 each user signal from an output of the reception beam formation means;
17 reception beam calculation means for calculating an overall
18 reception quality for a path delay/reception beam number of a user signal
19 present in the reception beam to output a user transmission beam number,
20 and outputting user reception data using the path delay/reception beam
21 number;
22 path delay/reception beam selection means for selecting the path
23 delay/reception beam number used for demodulation on the basis of a
24 reception quality of a user signal corresponding to the path delay/reception
25 beam number as an output from said reception beam path detection
26 means;;
27 demodulation means for performing demodulation using the path
28 delay/reception beam number notified by said path delay/reception beam
29 selection means;
30 user modulation means for receiving user transmission data,
31 performing a modulation process, and outputting a modulated user signal;
32 user transmission beam switching means for receiving the user
33 transmission beam number and the modulated user signal, and outputting
34 the modulated user signal so as to form a transmission beam corresponding
35 to the user transmission beam number;
36 transmission beam selection means for selecting a transmission
37 beam on the basis of overall reception quality calculated of the user signal
38 for each reception beam that is notified by the reception beam calculation
39 means, and notifying the user transmission beam switching means;
40 transmission beam formation means for receiving an output from
41 said user transmission beam switching means, and forming the
42 transmission beam;
43 radio transmission means for receiving an output from said
44 transmission beam formation means, performing a transmission process for

45 an input signal, and outputting the signal; and
46 a transmission array antenna in which transmission antenna
47 elements for transmitting an output from said radio transmission means are
48 arranged.

1 6 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 5, wherein said reception beam calculation means uses
3 reception power as an index of the reception quality and calculates overall
4 reception power as the overall reception quality when the overall reception
5 quality of the user signal for each reception beam is calculated from the
6 reception quality of the user signal corresponding to the path
7 delay/reception beam number as an output from said reception beam path
8 detection means.

1 7 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 5, wherein said reception beam calculation means uses
3 SIR as an index of the reception quality and calculates overall SIR as the
4 overall reception quality when the overall reception quality of the user
5 signal for each reception beam is calculated from the reception quality of
6 the user signal corresponding to the path delay/reception beam number as
7 an output from said reception beam path detection means.

1 8 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 5, wherein said reception beam calculation means
3 calculates the overall reception quality of the user signal for each reception
4 beam by using a reception quality corresponding to a path delay/reception
5 beam number selected on the basis of a predetermined criterion when the
6 overall reception quality of the user signal is calculated for each reception
7 beam from the reception quality of the user signal corresponding to the
8 path delay/reception beam number as an output from said reception beam
9 path detection means.

1 9 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 8, wherein said reception beam calculation means
3 selects P (P is an integer of not less than 2) upper path delays/reception
4 beam numbers excellent in reception quality as the path delay/reception
5 beam number selected on the basis of the predetermined criterion.

1 10 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 8, wherein said reception beam calculation means
3 selects, as the path delay/reception beam number selected on the basis of
4 the predetermined criterion, a maximum of Q (Q is an integer of not less
5 than 2) path delays/reception beam numbers with which the reception
6 quality satisfies a predetermined reception quality criterion.

1 11 (Previously Presented). The multi-beam antenna transmitter/receiver
2 according to claim 8, wherein said reception beam calculation means uses
3 the path delay/reception beam number selected by said path
4 delay/reception beam selection means as the path delay/reception beam
5 number selected on the basis of the predetermined criterion.

12 (Canceled).

13 (Canceled).

1 14 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim ~~13~~ 17, ~~characterized in that in the said~~
3 ~~calculation step wherein~~ the reception beam is selected on the basis of the
4 overall reception quality, and the transmission beam having a direction
5 which coincides with or is close to a direction of the selected reception
6 beam is selected.

1 15 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim ~~13~~ 17, ~~characterized in that in said calculation~~

- 3 ~~step wherein~~ reception power or an SIR (Signal to Interference Ratio) is
4 used as an index of the reception quality.

16 (Canceled).

- 1 17 (Currently Amended). ~~The A~~ multi-beam antenna
2 transmitting/receiving method ~~according to claim 16~~, wherein the user
3 ~~demodulation step further comprises~~ comprising the steps of:
4 a radio reception step of receiving outputs from reception antenna
5 elements which form a reception array antenna, performing a reception
6 process for input signals, and outputting the signals;
7 a reception beam formation step of receiving signals output from
8 the radio reception step and forming a reception beam;
9 a reception beam path detecting step of detecting a path delay for
10 each user from an output from the reception beam formation step;
11 a path delay/reception beam selection step of selecting the path
12 delay/reception beam number used for demodulation on the basis of a
13 reception quality of a user signal corresponding to the path delay/reception
14 beam number as an output from the reception beam path detection step;
15 a demodulation step of performing demodulation using the path
16 delay/reception beam number notified in the path delay/reception beam
17 selection step,
18 a reception beam calculation step of calculating of an overall
19 reception quality of a user signal corresponding to the path delay/reception
20 beam number as an output from the reception beam path detection step,
21 and
22 a user modulation step of receiving user transmission data,
23 performing a modulation process, and outputting a modulated user signal,
24 a user transmission beam switching step of receiving the user
25 transmission beam number and the modulated user signal, and outputting
26 the modulated user signal so as to form a transmission beam corresponding
27 to the user beam number,

28 a transmission beam selection step of selecting a transmission beam
29 on the basis of overall reception quality calculated of the user signal for
30 each reception beam that is notified in the reception beam calculation step,
31 and notifying the user transmission beam switching step of the
32 transmission beam,
33 a transmission beam formation step of receiving an output from the
34 user transmission beam switching step, and forming the transmission
35 beam, and
36 a radio transmission step of receiving an output from the
37 transmission beam formation step, performing a transmission process for
38 an input signal, and outputting the signal to transmission antenna elements
39 which form a transmission array antenna.

1 18 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 17, ~~characterized in that wherein~~ in the
3 reception beam calculation step, reception power is used as an index of the
4 reception quality, and overall reception power is calculated as the overall
5 reception quality when the overall reception quality of the user signal for
6 each reception beam is calculated from the reception quality of the user
7 signal corresponding to the path delay/reception beam number as an output
8 from the reception beam path detection step.

1 19 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 17, ~~characterized in that wherein~~ in the
3 reception beam calculation step, SIR is used as an index of the reception
4 quality, and overall SIR is calculated as the overall reception quality when
5 the overall reception quality of the user signal for each reception beam is
6 calculated from the reception quality of the user signal corresponding to
7 the path delay/reception beam number as an output from the reception
8 beam path detection step.

1 20 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 17, ~~characterized in that wherein~~ in the
3 reception beam calculation step, the overall reception quality of the user
4 signal is calculated for each reception beam by using a reception quality
5 corresponding to a path delay/reception beam number selected on the basis
6 of a predetermined criterion when the overall reception quality of the user
7 signal is calculated for each reception beam from the reception quality of
8 the user signal corresponding to the path delay/reception beam number as
9 an output from the reception beam path detection step.

1 21 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 20, ~~characterized in that wherein~~ in the
3 reception beam calculation step, P (P is an integer of not less than 2) upper
4 path delays/reception beam numbers excellent in reception quality are
5 selected as the path delay/reception beam number selected on the basis of
6 the predetermined criterion.

1 22 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 20, ~~characterized in that wherein~~ in the
3 reception beam calculation step, a maximum of Q (Q is an integer of not
4 less than 2) path delays/reception beam numbers with which the reception
5 quality satisfies a predetermined reception quality criterion are selected as
6 the path delay/reception beam number selected on the basis of the
7 predetermined criterion.

1 23 (Currently Amended). The multi-beam antenna transmitting/receiving
2 method according to claim 20, ~~characterized in that wherein~~ in the
3 reception beam calculation step, the path delay/reception beam number
4 selected in the path delay/reception beam selection step is used as the path
5 delay/reception beam number selected on the basis of the predetermined
6 criterion.

24 (Canceled).

25 (Canceled).

26 (Canceled).

27 (Currently Amended). A base station characterized by comprising a multi-beam antenna transmitter/receiver ~~which has~~ receiving a plurality of reception beams and transmitting a plurality of transmission beams, ~~which includes the multi-beam antenna transmitter/receiver comprising:~~

user demodulation means for receiving an output from reception beam formation means, said user demodulation means including:

reception beam formation means forming a reception beam from signals received from said plurality of reception beams;

reception beam path detection means for detecting a path delay for each user signal from an output from said reception beam formation means and outputting ~~the a~~ path delay/reception beam number;

path delay/reception beam selection means for selecting the path delay/reception beam number used for demodulation on the basis of a reception quality of a user signal corresponding to the path delay/reception beam number as an output from said reception beam path detection means;

reception beam calculation means for calculating an overall reception quality of a user signal for each reception beam from the reception quality of the user signal corresponding to a path delay/reception beam number as an output from the reception beam path detection means; and

user transmission beam switching means for receiving the user beam number and a modulated user signal, and outputting the modulated user signal so as to form a transmission beam corresponding to the user transmission beam number;

transmission beam selection means for selecting the transmission beam on the basis of overall reception qualities calculated from reception

27 qualities of path delays of user signals present in the plurality of reception
28 beams as determined by the reception beam calculation means; and
29 transmission beam formation means receiving an output from the
30 transmission beam switching means and forming said plurality of
31 transmission beams.

1 28 (Currently Amended). A mobile station ~~characterized by~~ comprising a
2 multi-beam antenna transmitter/receiver ~~which has~~ receiving a plurality of
3 reception beams and transmitting a plurality of transmission beams, ~~which~~
4 ~~includes the multi-beam antenna transmitter/receiver comprising:~~
5 user demodulation means for receiving an output from reception
6 beam formation means, said user demodulation means including:
7 reception beam formation means forming a reception beam from
8 signals received from said plurality of reception beams;
9 reception beam path detection means for detecting a path delay for
10 each user signal from an output from said reception beam formation means
11 and outputting the a path delay/reception beam number;
12 path delay/reception beam selection means for selecting the path
13 delay/reception beam number used for demodulation on the basis of a
14 reception quality of a user signal corresponding to the path delay/reception
15 beam number as an output from said reception beam path detection means;
16 reception beam calculation means for calculating an overall
17 reception quality of a user signal for each reception beam from the
18 reception quality of the user signal corresponding to a path delay/reception
19 beam number as an output from the reception beam path detection means;
20 and
21 user transmission beam switching means for receiving the user
22 beam number and a modulated user signal, and outputting the modulated
23 user signal so as to form a transmission beam corresponding to the user
24 transmission beam number;
25 transmission beam selection means for selecting the transmission
26 beam on the basis of overall reception qualities calculated from reception

27 qualities of path delays of user signals present in the plurality of reception
28 beams as determined by the reception beam calculation means; and
29 transmission beam formation means receiving an output from the
30 transmission beam switching means and forming said plurality of
31 transmission beams.